

Universität Zürich
Institut für Pharmakologie and Toxikologie
Sektion für Psychopharmakologie and Schlafforschung
Direktor: Prof. Dr. med. H. U. Zeilhofer

Arbeit unter Leitung von Prof. Dr. sc. nat. H.-P. Landolt

Functional genetic variation of adenosine deaminase and the effects of sleep deprivation in healthy individuals

INAUGURAL-DISSERTATION

zur Erlangung der Doktorwürde der Medizinischen Fakultät
der Universität Zürich

vorgelegt von
Federica Rosina Patmina Klaus
von Zürich ZH

Genehmigt auf Antrag von Prof. Dr. med. H. U. Zeilhofer
Zürich 2010

Table of contents

1. Summary, Abbreviations and Definitions	3
1.1. Abbreviations and Definitions	3
1.2. Summary	4
2. Introduction	5
2.1. Sleep architecture	7
2.1.1. Sleep stages	7
2.2. Sleep regulation	12
2.2.1. Homeostatic process S	13
2.2.2. Circadian Process C	14
2.2.3. Ultradian process	14
2.2.5. Challenges of sleep regulatory processes	15
2.3. Adenosine, Adenosine deaminase and Sleep	17
2.4. Aim of the present study	19
3. Materials and Methods	20
3.1. Participants	20
3.2. Genotyping	20
3.3. Study design	21
3.4. Polysomnography recordings	22
3.5. Sleep EEG	22
3.6. Waking EEG	23
3.7. Psychomotor vigilance task (PVT)	23
3.8. Stanford Sleepiness Scale (SSS)	24
3.9. Statistical analysis	24
4. Results	25
4.1. Demographic characteristics of study participants	25
4.2. Nocturnal polysomnography	25
4.2.1. Sleep architecture	25
4.2.2. Sleep EEG power spectra	27
4.3. Waking EEG	32
4.3.1. Evolution of EEG power in wakefulness during sleep deprivation	34
4.4. Psychomotor vigilance task (PVT)	36
4.5. Stanford Sleepiness Scale (SSS)	39
5. Discussion	40
6. Appendix	43
6.1. PVT: Additional data	43
6.2. Evolution of 1-5 Hz power in waking EEG throughout prolonged wakefulness	44
6.3. Evolution of 5-8 Hz power in waking EEG throughout prolonged wakefulness	45
7. References	46
8. Acknowledgement	50
9. Curriculum Vitae	51